THE U.S DEPARTMENT OF STATE and MINISTRY OF ENERGY & MINERAL RESOURCES OF THE REPUBLIC OF INDONESIA

A REGIONAL WORKSHOP on the CHANGING GLOBAL GAS MARKET AND UNCONVENTIONAL GAS

OPPORTUNITIES AND CHALLENGES FOR UNCONVENTIONAL PROJECTS IN INDONESIA

By:

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08 MAY 2013

Gran Melia Hotel, Kuningan, JAKARTA

OUTLINES

- ***I. INTRODUCTION***
- ***II. ALTERNATIVE ENERGY***
- ***III. WORLD'S NEW ENERGY***
- ***IV. DEVELOPMENT HISTORY***
- ***V. S.W.O.T ANALYSES***
- ***VI. CONCLUSIONS***

I. INTRODUCTION

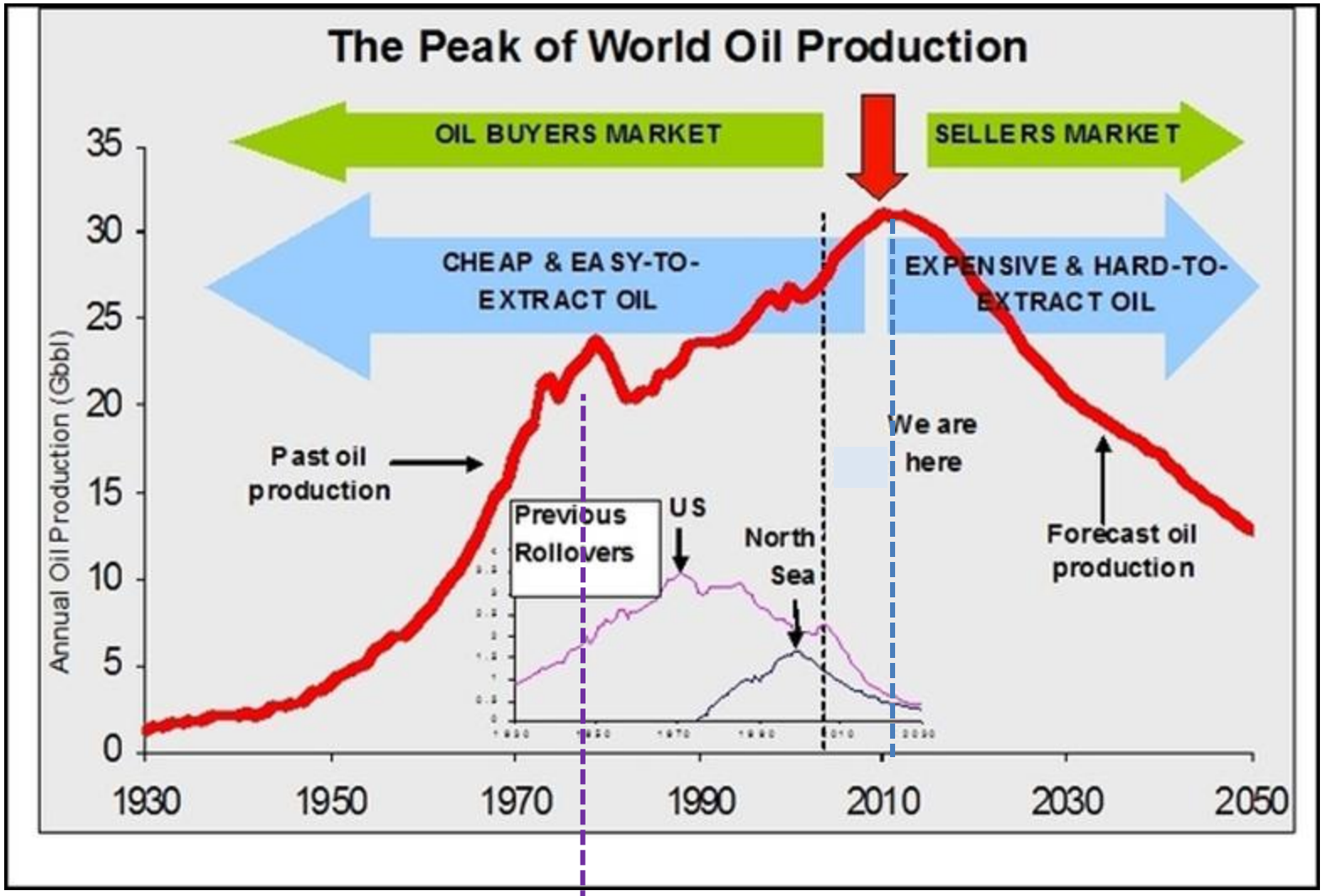
- ***STATUS CHANGE; FROM EXPORTIR OIL & GAS BECOMING NET IMPORTIR OIL&GAS (2002)***

- ***YEAR 1982, NATIONAL ENERGY POLICY (KEBIJAKAN ENERGI NASIONAL (KEN)), GOI PROPOSED 5 (FIVE) STRATEGIC POLICY IN THE ENERGY SECTOR, I,E; INTENSIFICATION, DIVERSIFICATION, CONSERVATION, INDEXSATION AND ENERGY PRICE.***

- ***YEAR 2003, NATIONAL ENERGY POLICY (KEN) YEAR 2003 – 2020; TO CREATE THE SECURITY OF NATIONAL ENERGY SUPPLY (KEAMANAN PASOKAN ENERGI NASIONAL) HAVING SUSTAINABLE AND EFFICIENT USE OF ENERGY FOR THE NATION***

- ***THE FACTS TODAY: WE ARE LACKING OF OIL AND GAS (?) PRODUCTION (BECOMING NET IMPORTER) AND CAUSE ENERGY CRISES IN LACKING OF FULFILLING THE NEED OF ENERGY***

- ***ON THOSE BASIS; THE DEVELOPMENT OF ALTERNATIVE ENERGY BECOMING ONE OF SOLUTIONS FOR INDONESIA TO BE SELF-SUSTAIN IN ENERGY. IN ADDITION TO GET OUT FROM ENERGY CRISES.***



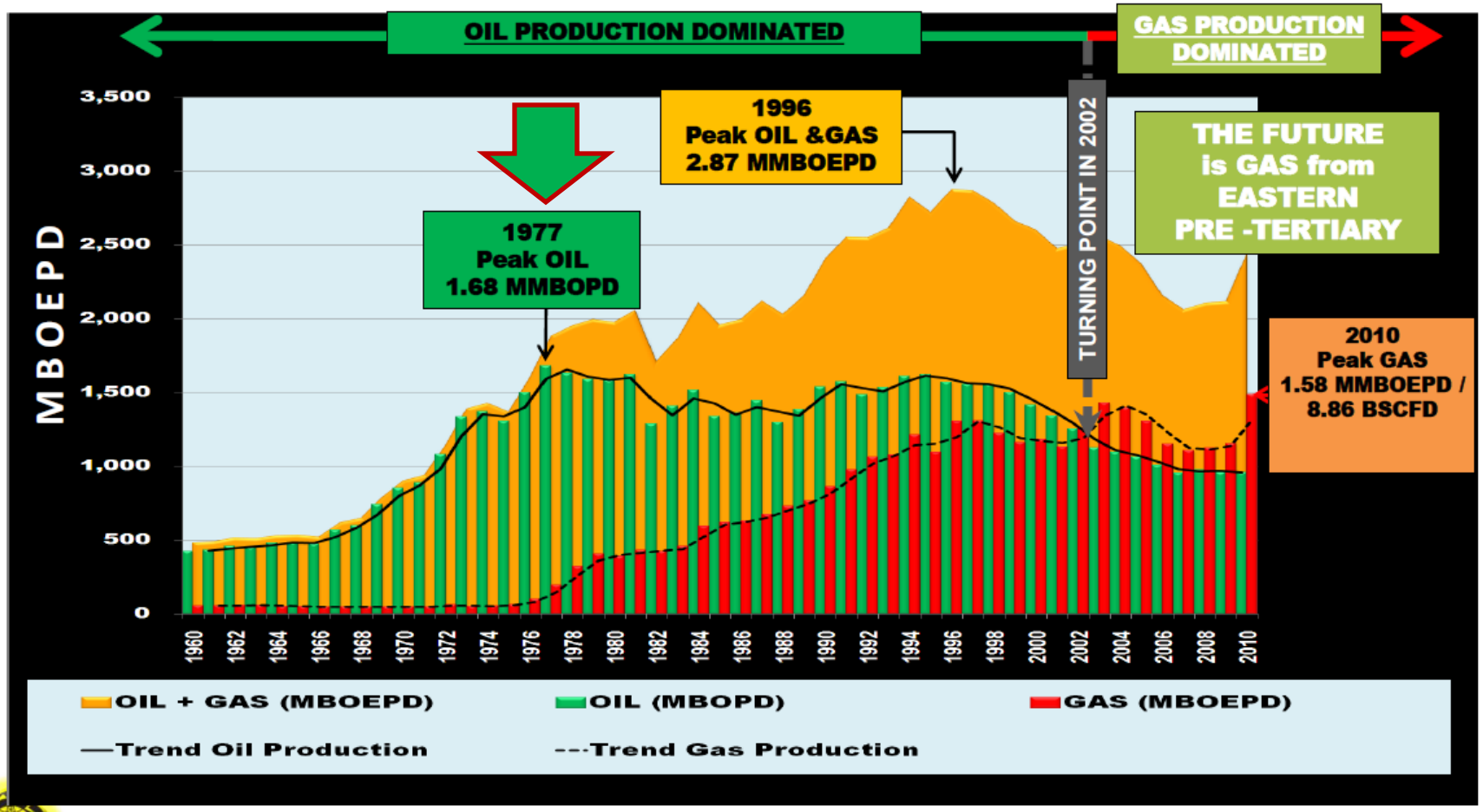
PEAK OIL INDONESIA

Sumber: Googles

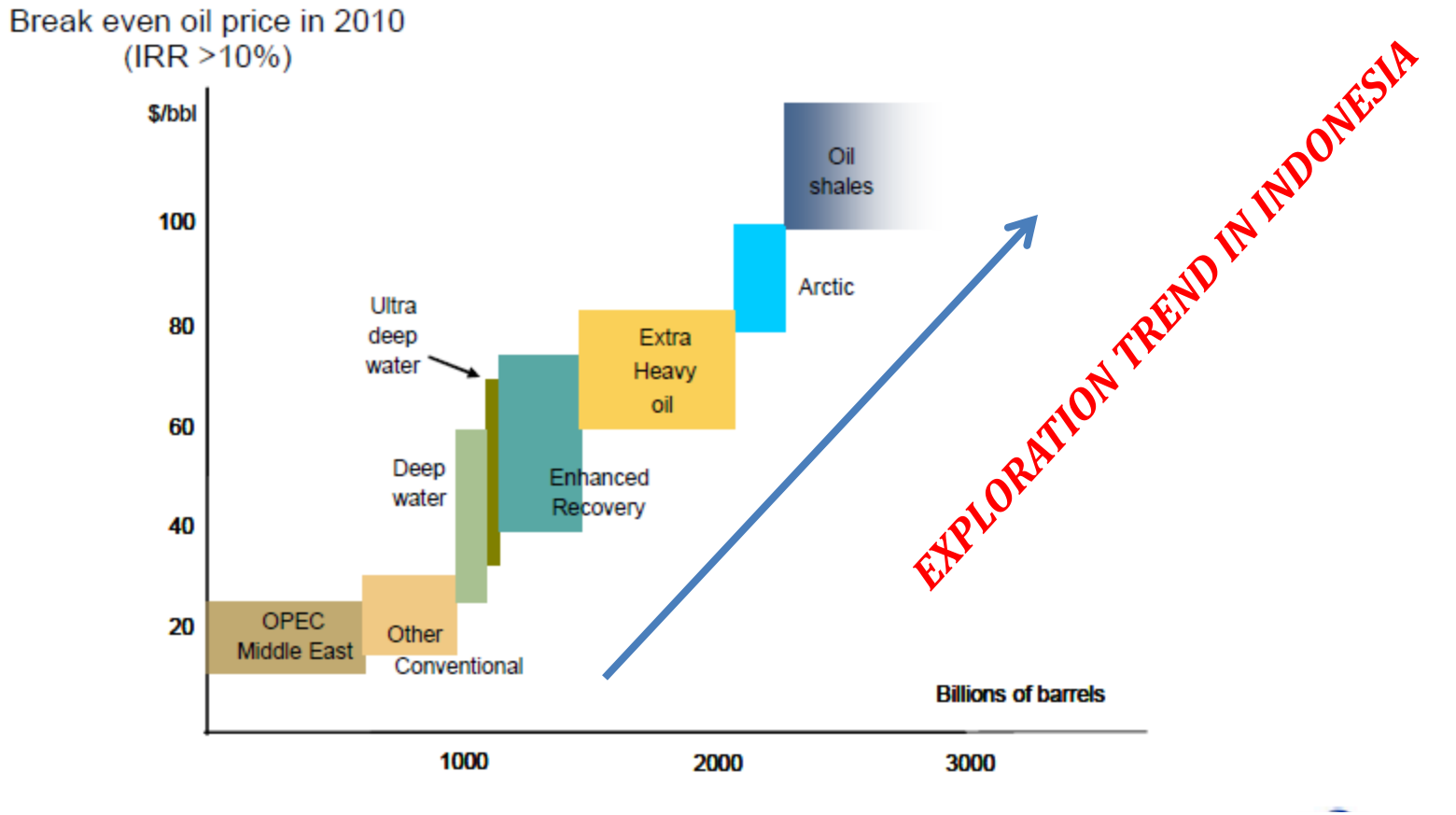
AS THE CURVE OF PEAK OIL PRODUCTION IN THE WHOLE WORLD IS ALSO DECREASING AND ALSO HAPPENED IN INDONESIAN

From Oil To Gas

Oil Production Decrease, but Gas Increase
Energy Supply Shift From Oil To Gas



High costs for the marginal projects

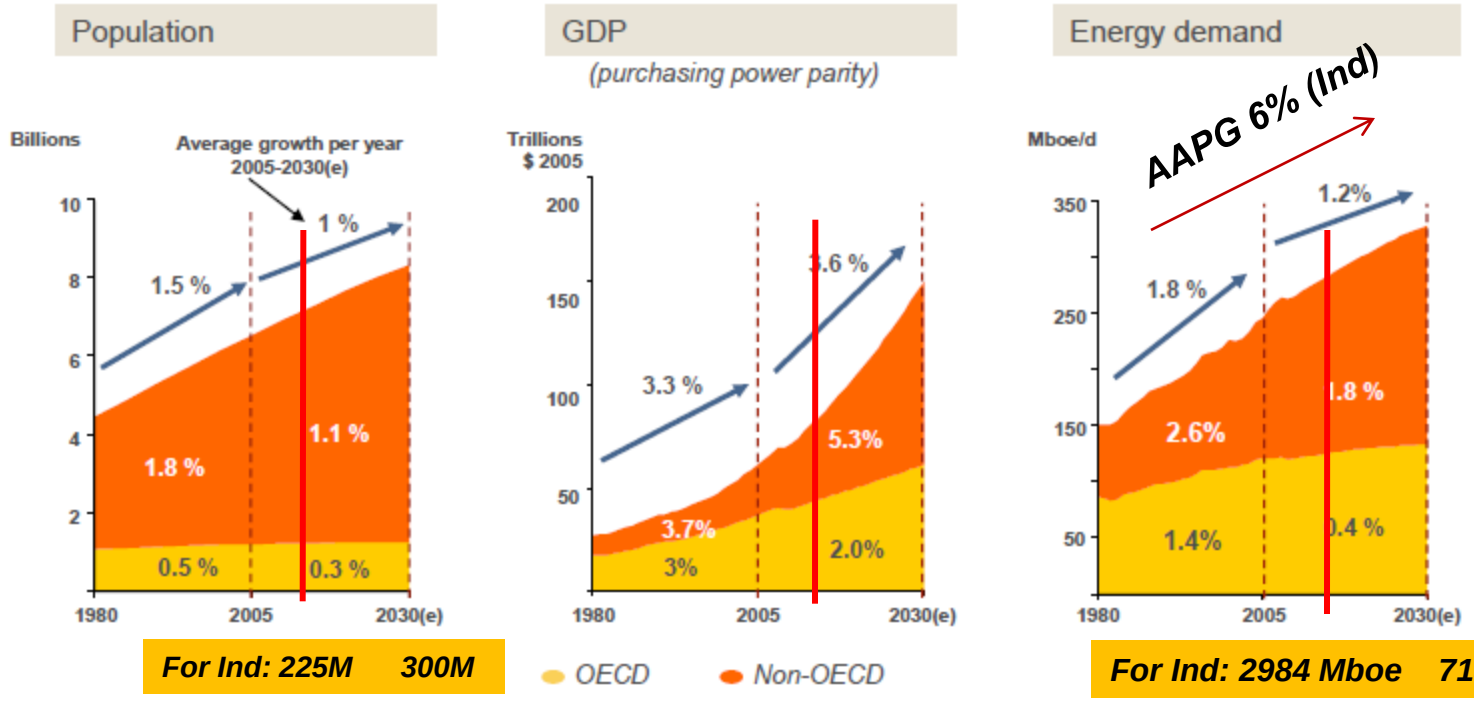


Source: Total Seminar 2010

COSTS OF OIL PER BARRELL IN DIFFERENT CONDITIONS WHICH IN THE SAME TIME THE TARGET OF OIL AND GAS EXPLORATION MOVING TO THE DEEP WATER WITH HIGH COST

WORLD ENERGY OUTLOOK

Global energy demand growth



Energy demand growth mainly driven by transportation and power generation
Need to limit energy demand

Sources : Total estimates

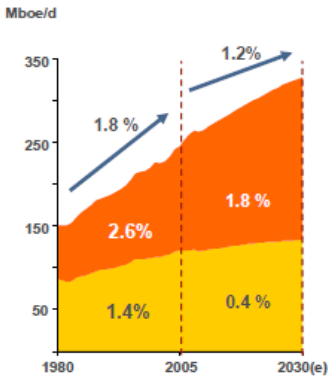
8

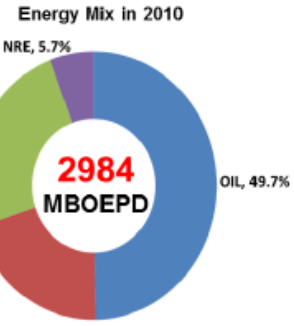
Source: Total Seminar 2010

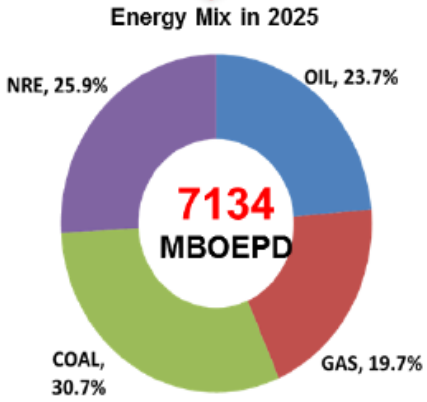
THE TREND OF GLOBAL ENERGY DEMAND GROWTH AS SEEN FROM DIFFERENT VIEWS AS ALSO IN INDONESIA

Energy demand

Indonesian Gas Market



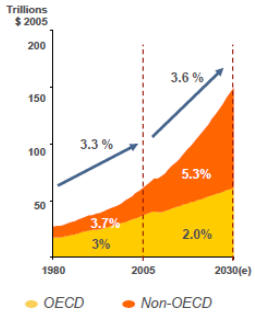




(Ref: SKK Migas, 2013)

Rapid Indonesia Energy Demand Growth

GDP
(purchasing power parity)



rowth of natural gas demand

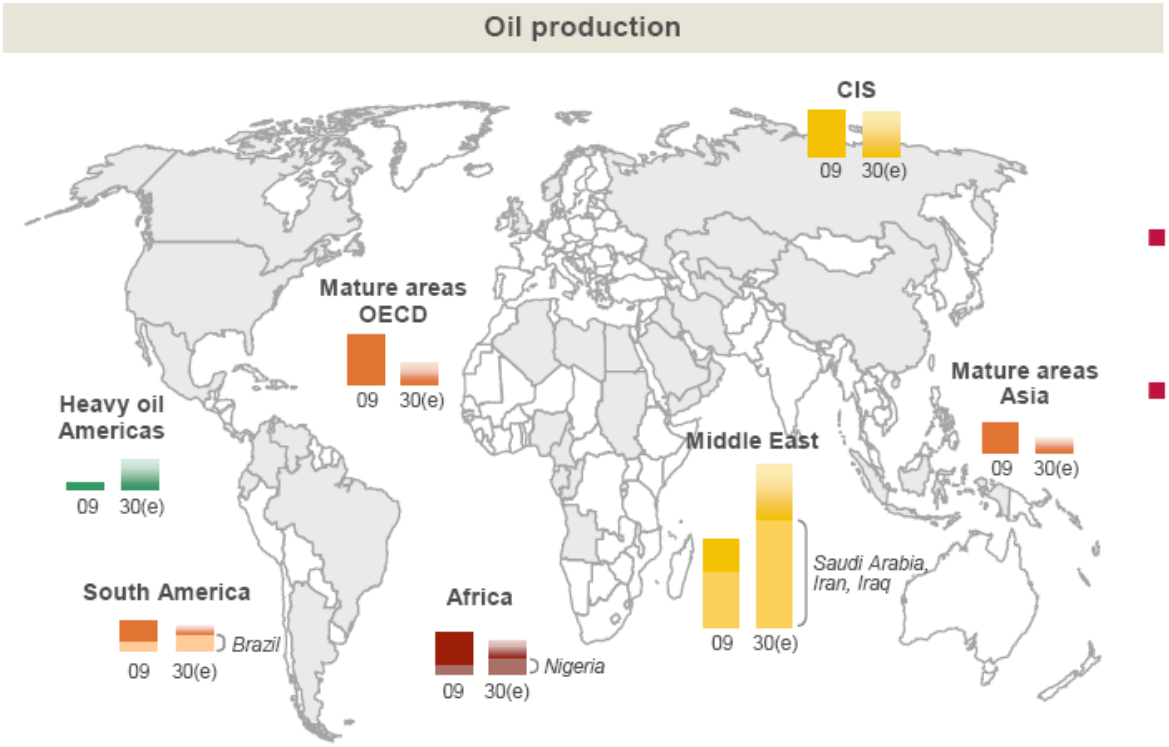
No Subsidy of Fuel for the Industries
Subsidies for industries revoked in 2005

Pricing and Efficiencies
Significant price and efficiencies benefit by converting to natural gas, as well as environmental concerns

Conversion of Power Plants
Pent-up demand from the conversion of existing dual fired power plants pending availability of gas

Demand from the industries
Require natural gas to compete in the era of Free Trade Agreement

Oil production by 2020-2030 around 95 million barrels per day



- Geopolitical uncertainties delaying development of new capacities
- Stronger role of OPEC, awaited growth of production in Iraq

sources : Total estimates

WHAT DOES IT MEANS IN TERMS OF THE GEOPOLITIC SITUATION FOR INDONESIA TOWARDS THE OIL AND GAS PRODUCTION DISTRIBUTION ?????

Source: Total Seminar 2010

- ***AS EXPLAINED ABOVE, INDONESIA DEFINETELY NEED ENERGY IN BIG QUANTITITY IN THE FUTURE; IN CONTRAST THE OIL PRODUCTION IS DECREASING SHARPLY AS ALSO BECOMING THE TREND IN THE WORLD***
- ***IN THE FUTURE, INDONESIA NEEDS TO FIND MUCH MORE ENERGY BY LOOKING INWARD WHAT WE HAVE THROUGH INTENSE DIVERSIFICATION ENERGY PROGRAM OR OTHERS TO FIND MORE ENERGIES***

II. ALTERNATIVE ENERGY

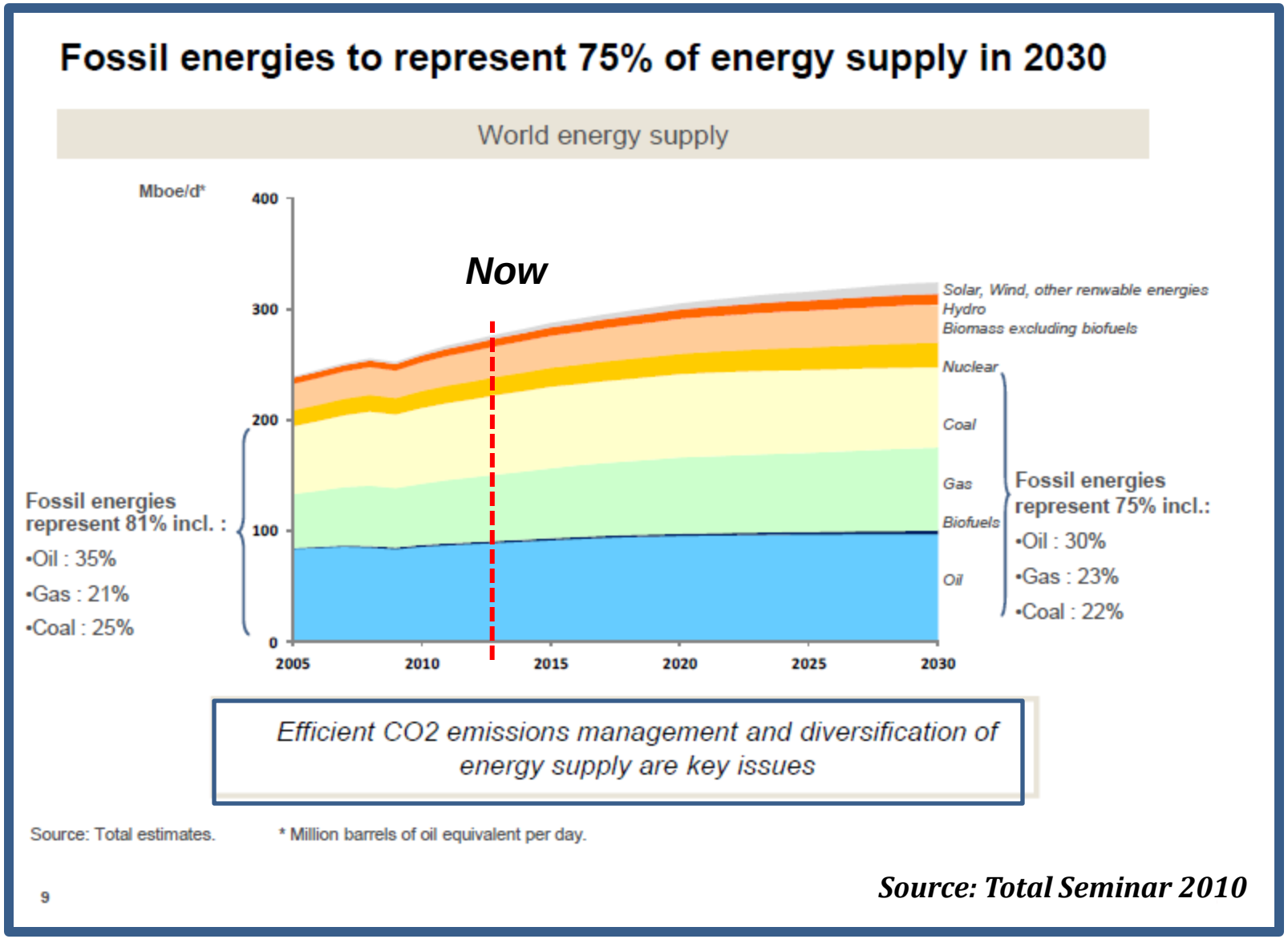
- ***NATIONAL ENERGY POLICY (KEN)YEAR 2003 – 2020; GOVERNMENT MAKE A STRONG EFFORT TO SEARCH FOR ALTERNATIVE ENERGY RESOURCES.***

- ***GLOBAL ISSUES AGAINST ENVIRONMENTAL PROBLEMS AND GLOBAL WARMING CAUSE GOVERNMENT TO DIRECT NEW ENERGY DEVELOPMENT TOWARDS ENVIRONMENTAL FRIENDLY AND ALSO RELATIVELY CHEAP AS IT CAN BE SOLUTIONS TO THE NATIONAL ENERGY NEEDS.***

- ***RESEARCH IN ALTERNATIVE ENERGY IN MANY PARTS OF THE WORLDS, SUCH AS; GEOTHERMAL ENERGY, BIOGAS, SOLAR, WIND, ETANOL, NUCLEAR, COAL, HYDRATE GAS, COAL BED METHANE (CBM) DAN SHALE GAS.***

- ***ALTERNATIVE ENERGY, SUCH AS, COAL BED METHANE AND SHALE GAS IS THE MAIN CHOICE DUE TO; 1. HUGE POTENSIAL RESOURCES IN INDONESIA. 2. ENVIRONMENTALLY FRIENDLY. 3. READY TO BE DEVELOPED IN THE NEAR FUTURE***

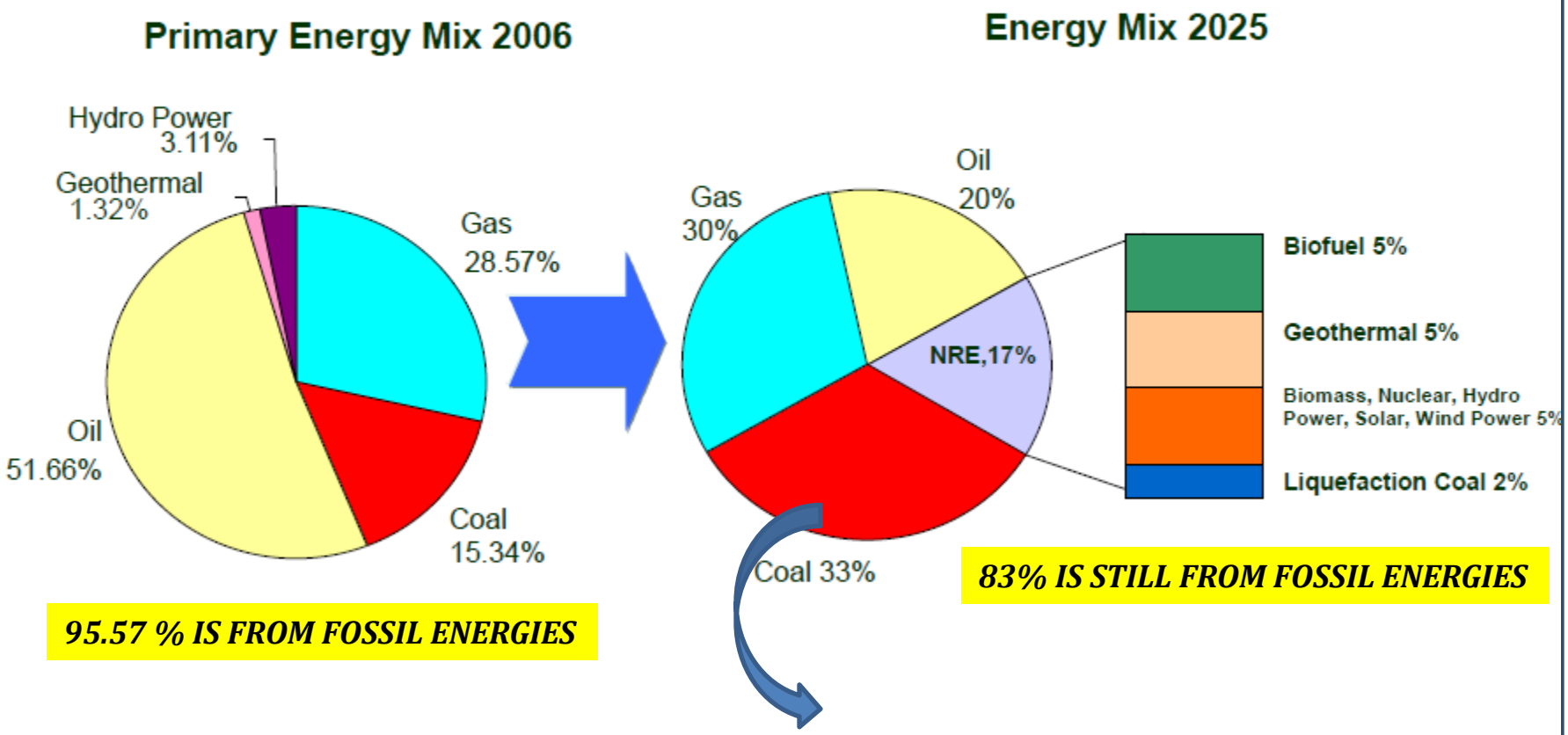
- ***FROM MANY PUBLICATION BASED ON PRELIMINARY RESEARCH BY DIFFERENT INSTITUTIONS, IT IS STATED THAT HYPOTHETIC RESOURCES IN INDONESIA; FOR CBM IS ABOUT 450 TCF AND FOR SHALE GAS IS AROUND 1000 TCF.***



Source: Total Seminar 2010

FOSSIL ENERGIES STIL REPRESENT 75% FROM TOTAL SUPPLY WORLD ENERGY IN THE YEAR 2030

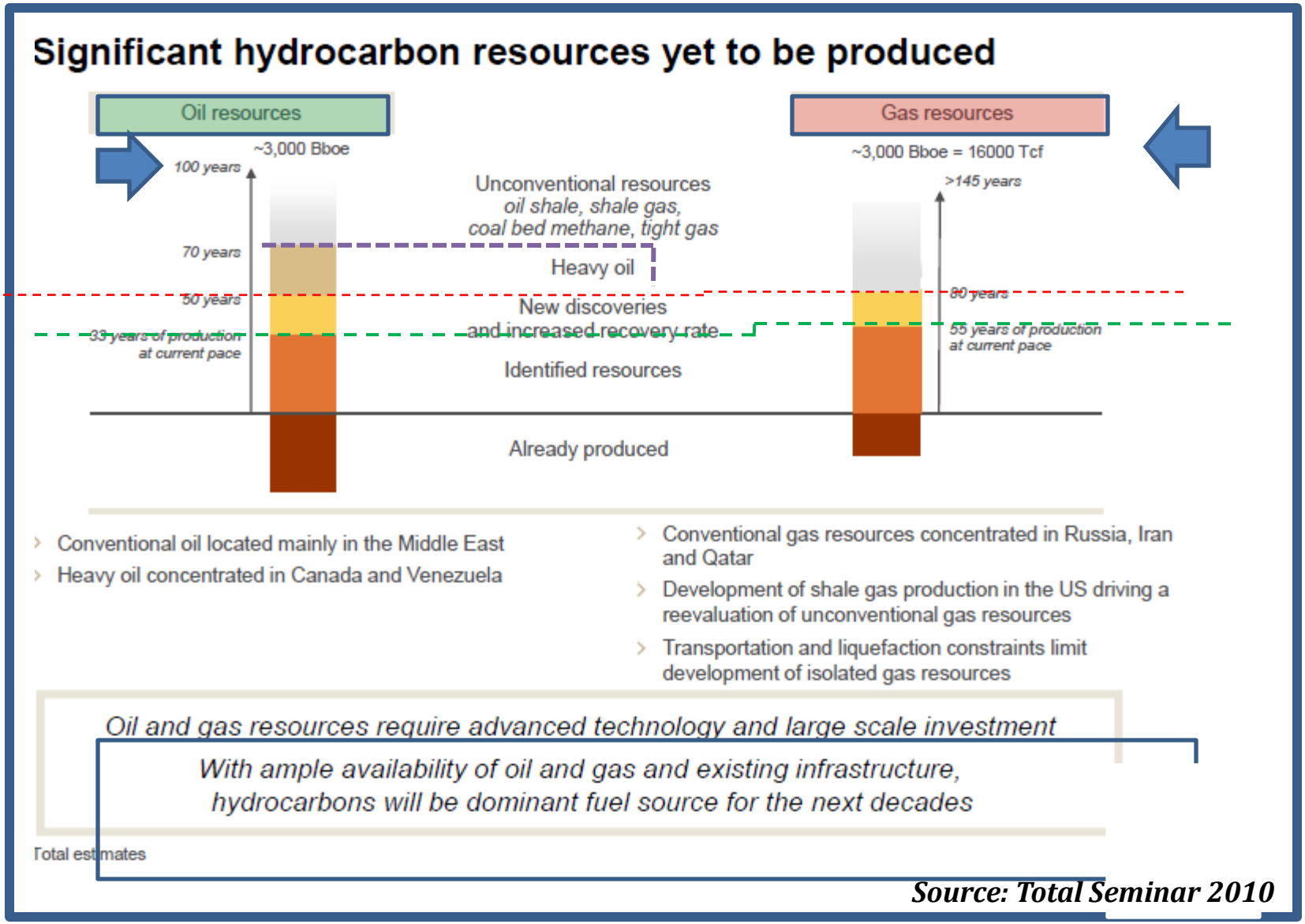
TARGET OF ENERGY MIX *)



*) Presidential Regulation No. 5 of 2006

THE USE OF COAL IN THE FUTURE IS SUBJECT TO DEBATE DUE TO ENVIRONEMNTAL PROBLEM

TARGET of ENERGI MIX NATIONAL of INDONESIA YEAR 2025 SHOWING TOTAL FOSSIL ENERGIES OF ABOUT 83%



Source: Total Seminar 2010

SIGNIFICANT HYDROCARBON RESOURCES YET TO BE PRODUCED TO SUPPORT THE WORLDWIDE NEEDS IN THE FUTURE

	Indonesia (Proven Reserves)	World Reserves	Resources	Remarks
Oil	4.2 Billion Barrels	1.24 Trilion Barrels	70 Billion Barrels (IOIP)	0.34% of world reserves
Conventional Natural Gas	157 Trillion SCF	6195 Trillion SCF	594 Trillion SCF	1.7% of world reserves
CBM			453 Trillion SCF	Rank 6th in the world
Geothermal			27000 MWe (Potential)	The highest rank in The World
Shale Gas			1000 TCF	Among the 10 biggest ???

Source: After Doddy Abdasah 2011

TOTAL RESERVE AND RESOURCES OF ENERGIES IN INDONESIA AND INTHE WORLD

III. WORLD'S NEW ENERGY

COAL BED METHANE

&

SHALE GAS

=

UNCONVENTIONAL HYDROCARBON

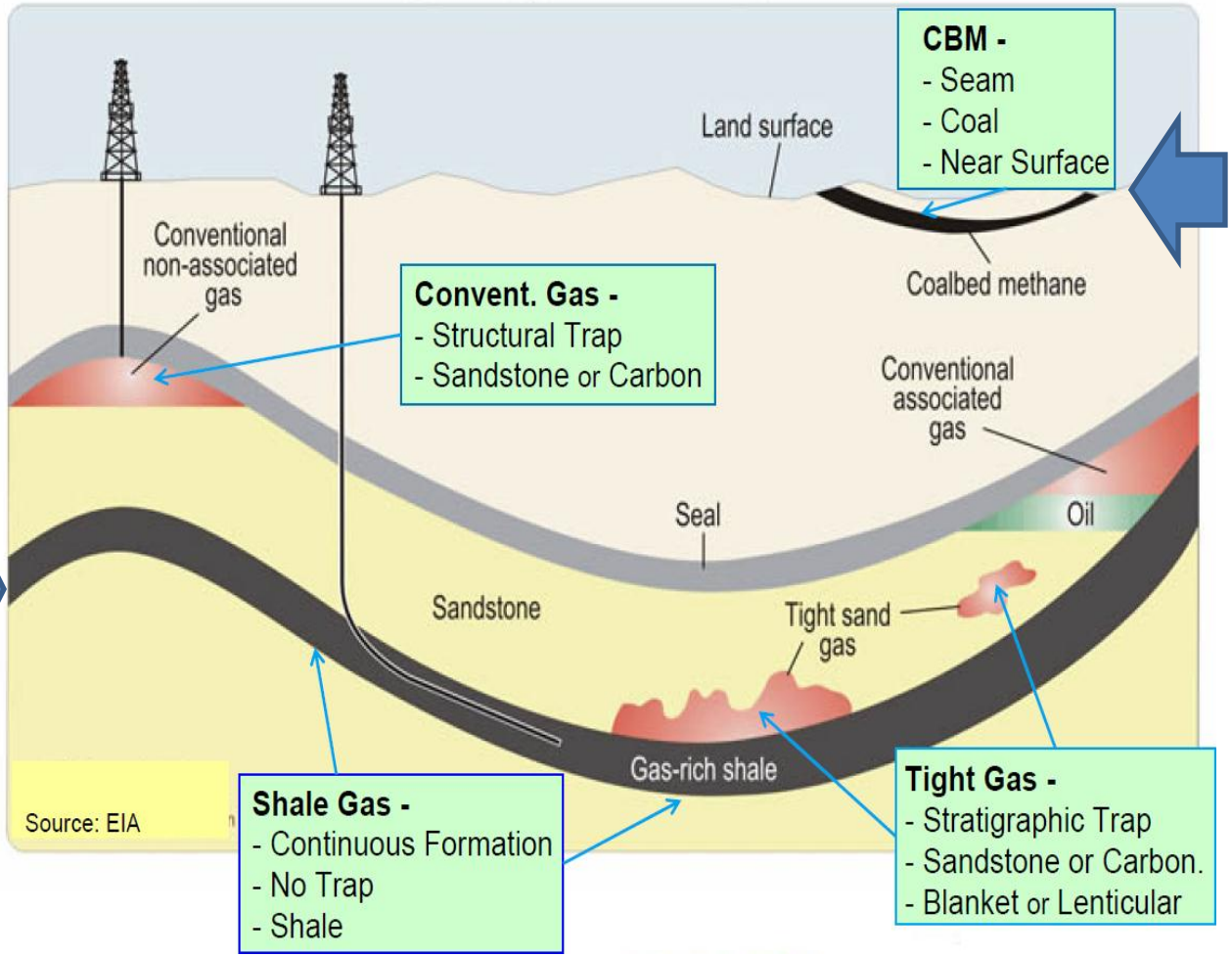
UNCONVENTIONAL HYDROCARBON CHARACTERISTICS

- *Clean burning- fuel*
- *Cheaper energy source*
- *Reducing global warming*
- *Friendly environment*

CONVENTIONAL AND UNCONVENTIONAL HIDROCARBON SYSTEM

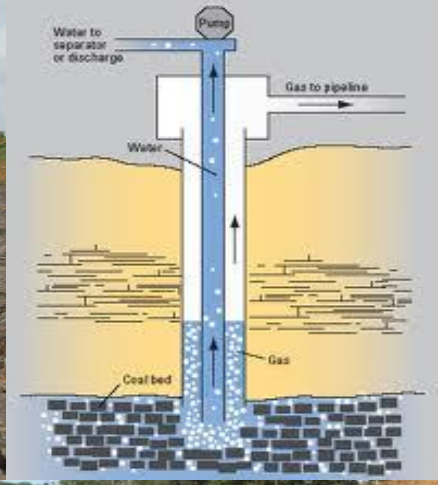
Conventional hydrocarbon is experienced migration

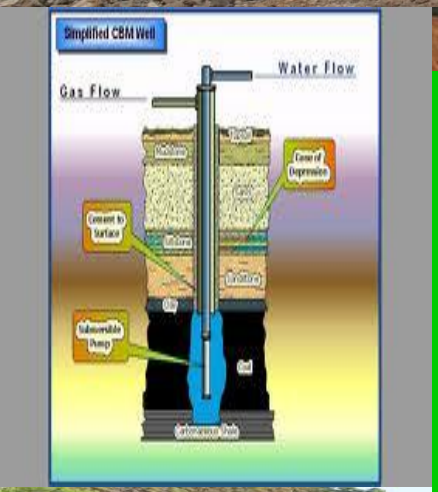
Unconventional hydrocarbon is not yet experienced migration



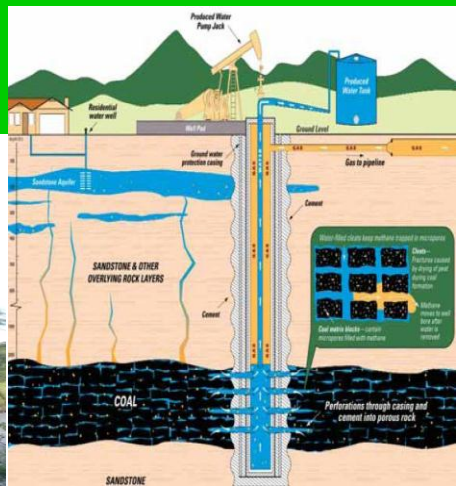
Unconventional hydrocarbon FROM Coal

A shale gas system is a self-contained source reservoir system. In this system, shales that generated the gas also function as low matrix permeability and low porosity reservoir rocks.

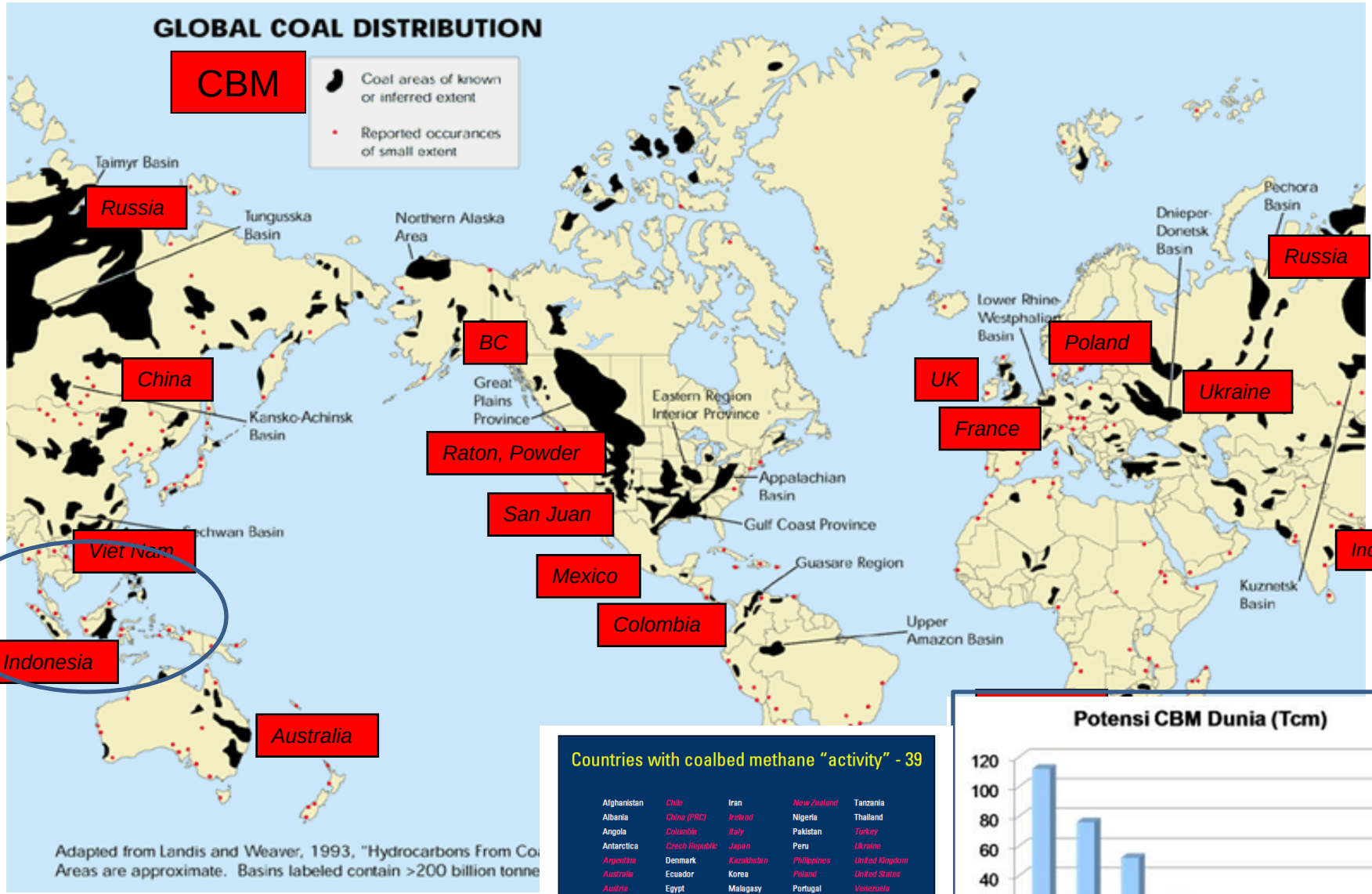


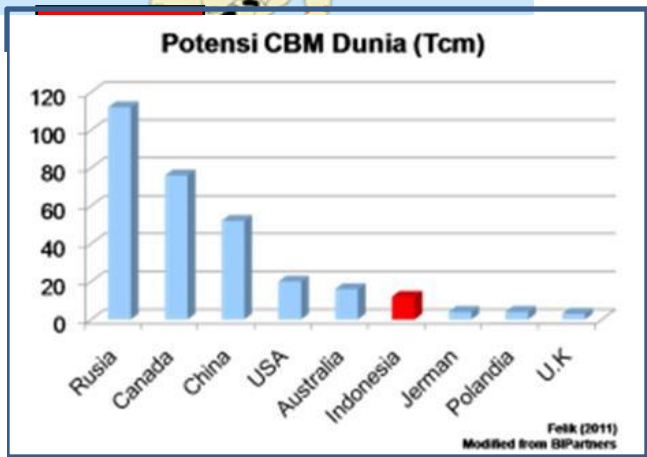


3.1. COAL BED METHANE (CBM)



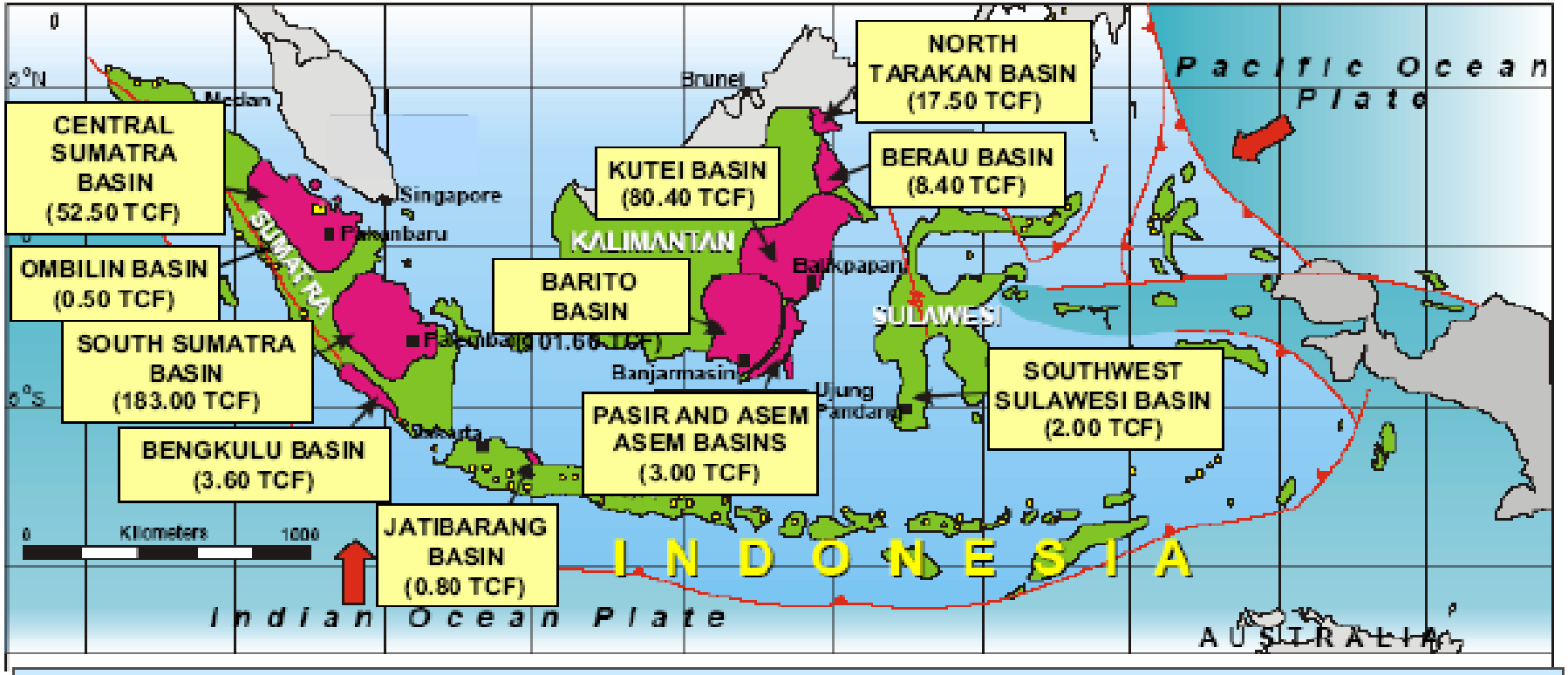
Global CBM Original Gas in Place >10,000 TCF





Global CBM Original Gas in Place >10,000 TCF

BASIN AREAS IN INDONESIAN WHERE CBM POTENTIAL IS LOCATED



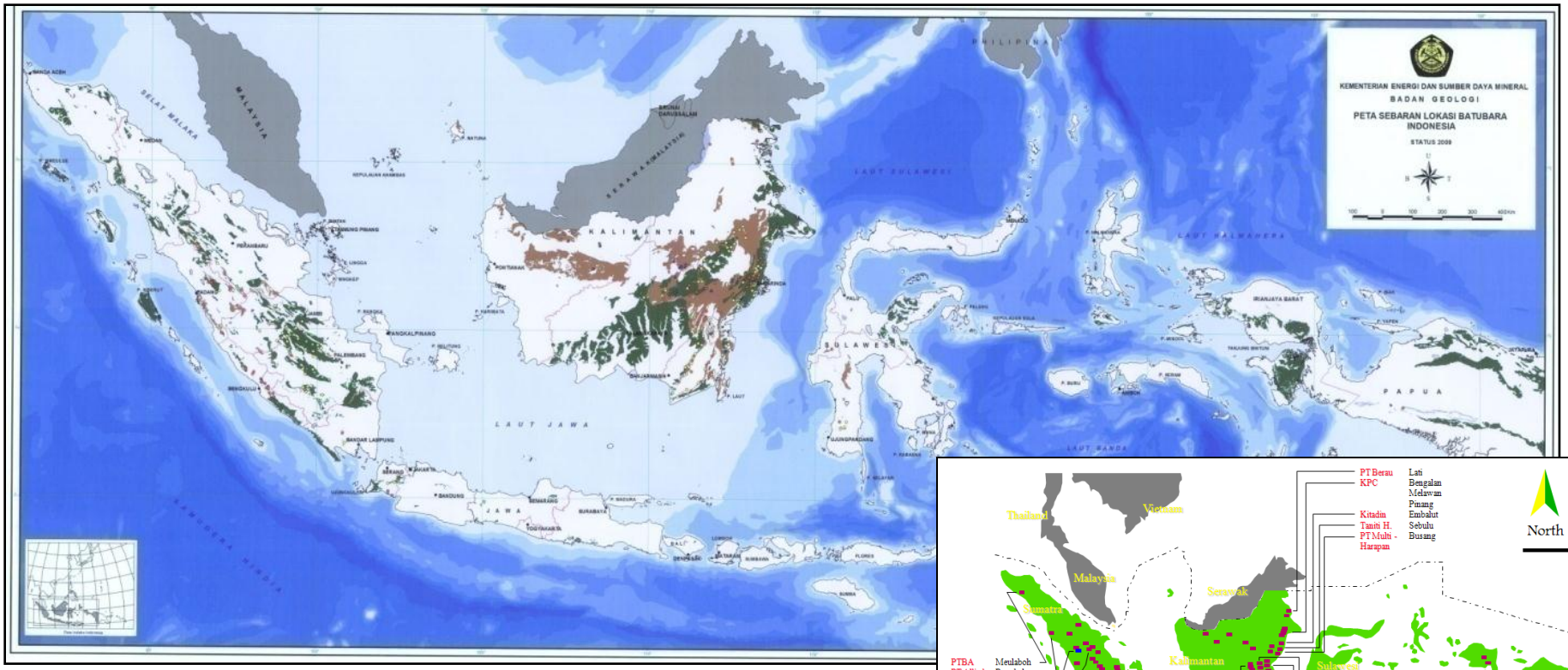
Total Resources = 453.30 TCF **Total of CBM Basins = 11**

Sumber: Presentasi Dirjen Migas, 25 Juni 2008

(Advanced Resources International, Inc., 2003)

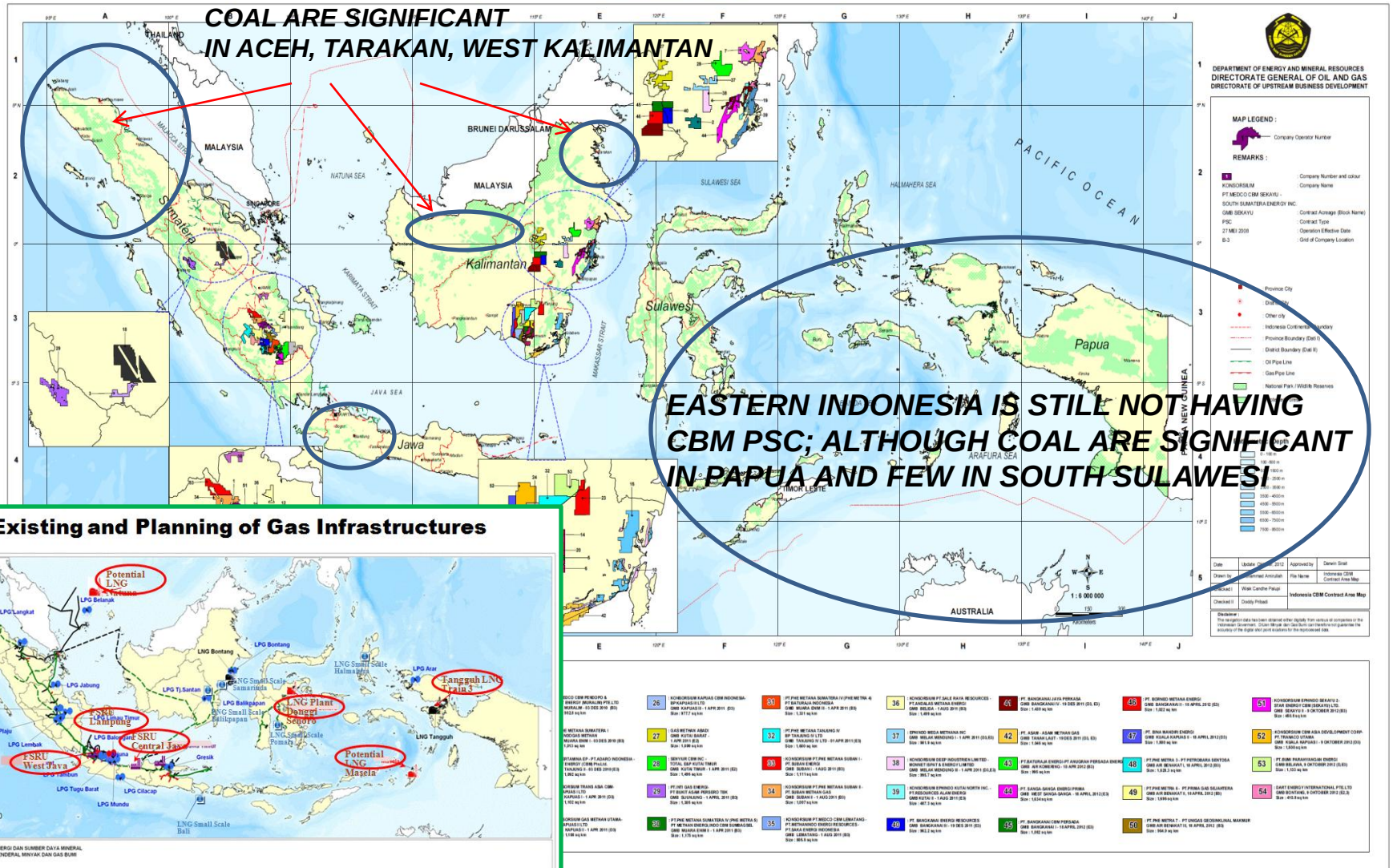
COAL BED METHANE IN INDONESIA

INDONESIA CBM POTENTIAL IS SIMPLY INDICATED BY THE DISTRIBUTION OF COAL AND COAL MINES



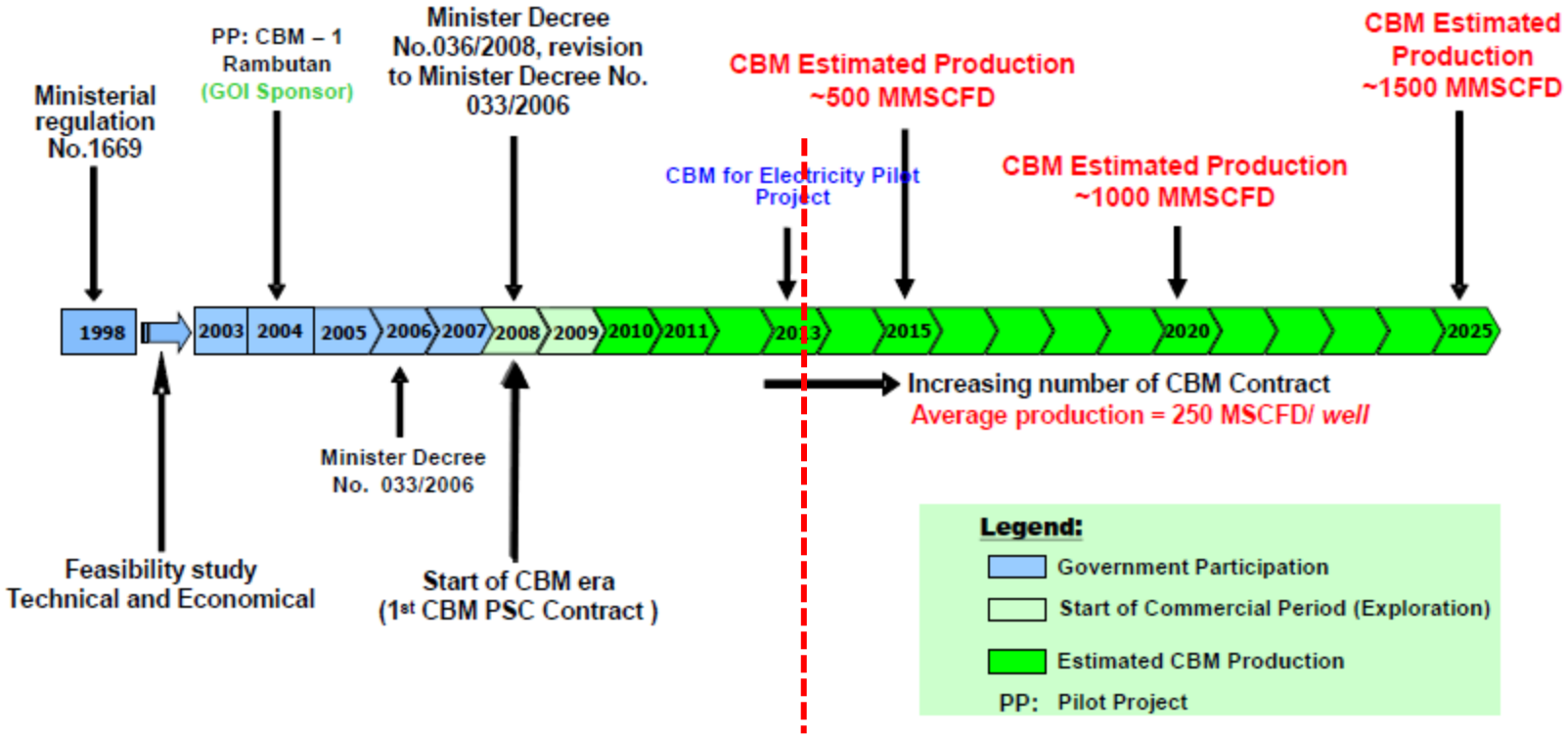
COAL MINES IN INDONESIA

INDONESIA CBM CONTRACT AREA MAP (THERE ARE 54 CBM PSC TILL MAY 2013)



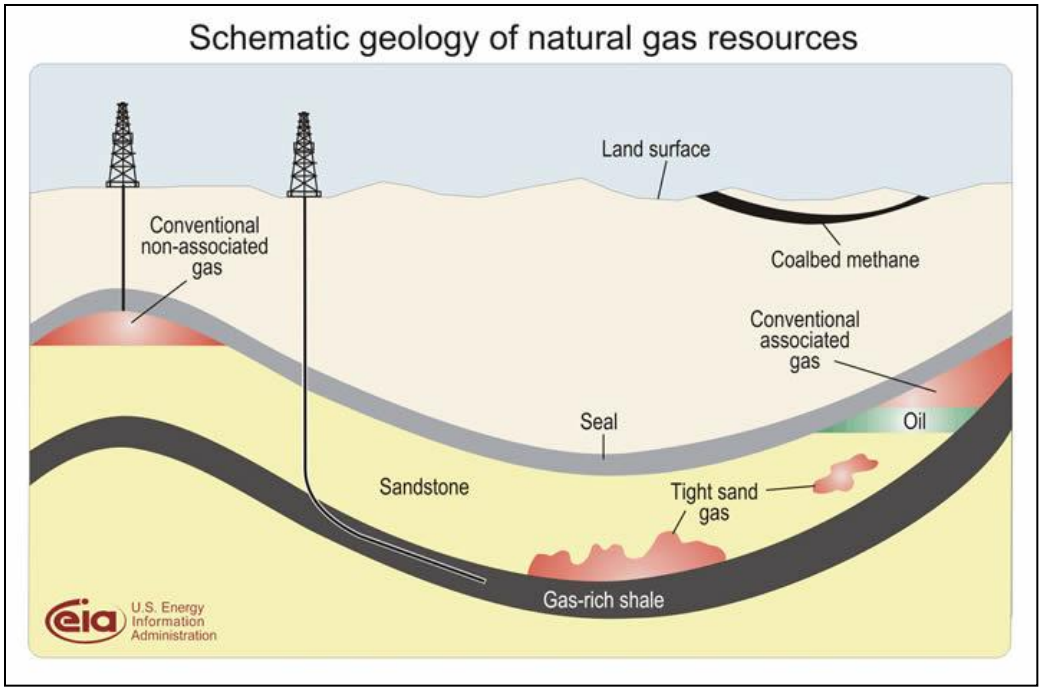
SINCE CBM NEED COST EFFICIENTCY, THE FACT THAT INFRASTRUCTURE IS STILL LIMITED CAUSE THE CBM PROJECT IN SOME PARTS ARE AT RISK

ROAD MAP of INDONESIAN CBM DEVELOPMENT

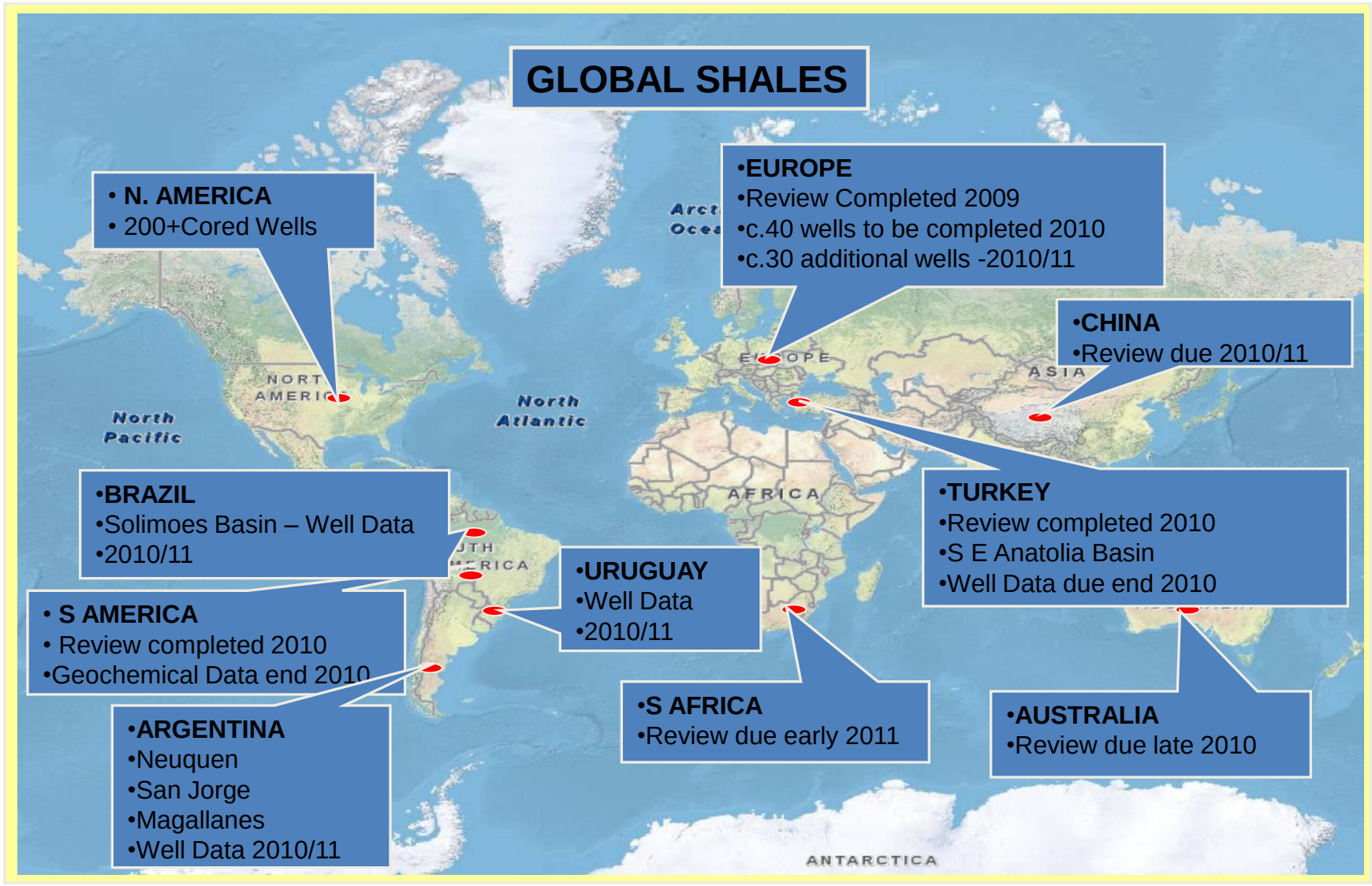


CAN THE TARGET OF THE ROAD MAP CAN BE ACHIEVED ???

3,2 SHALES GAS



Global Gas Shale Plays



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US Shale Gas Brief

September 2008

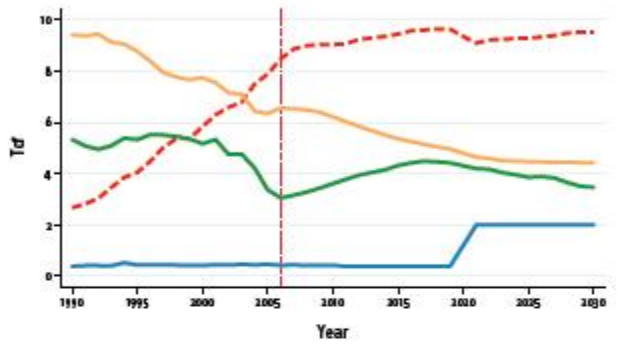
What is Shale Gas?

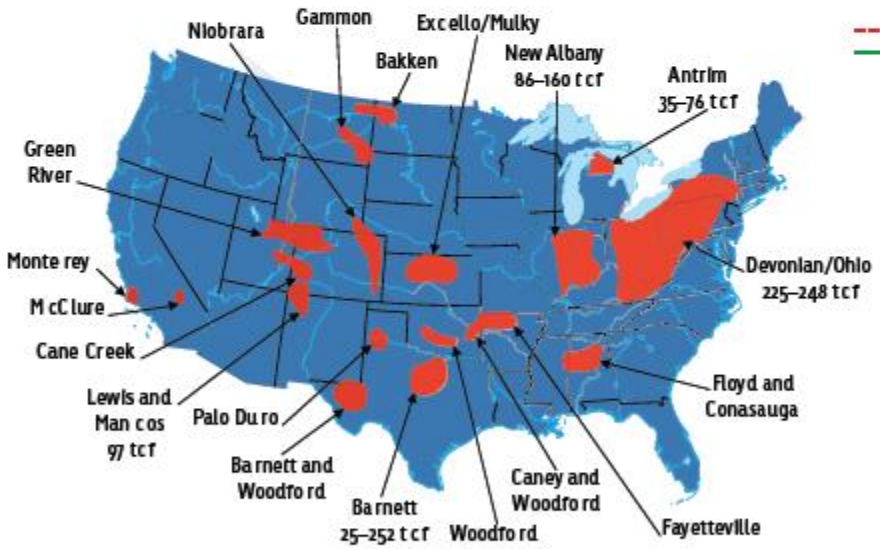
Shale Gas refers to **Natural Gas** produced from sedimentary rocks of laminated structure called shale. Shale rocks are formed by compaction and because of this they tend to have low porosity and extremely low permeability. As a result of their physical properties, extraction of gas from shale rocks is challenging and requires efficient and improved techniques, such as fracturing and horizontal drilling.

Where?

While there exist numerous potentially commercial shale gas deposits around the world, to this day only the US has achieved commercial production of shale gas, while Canada's industry is still in its infancy. In the US, Schlumberger estimates approximately 18 major shale gas basins exist with a resource potential of 500-1,000 Tcf. However, of those, only a handful of basins have achieved commercial success. Among the most established shale gas projects are: **Barnett** in Texas, **Woodford** in Oklahoma, **Fayetteville** in Arkansas, **Antrim** in Michigan, **Devonian/Ohio** (Appalachian Basin) between Kentuky, Virginia and West Virginia, and **New Albany** in Illinois.

▼ *Natural Gas Production by Source (adapted from EIA's 2008 Annual Energy Outlook)*





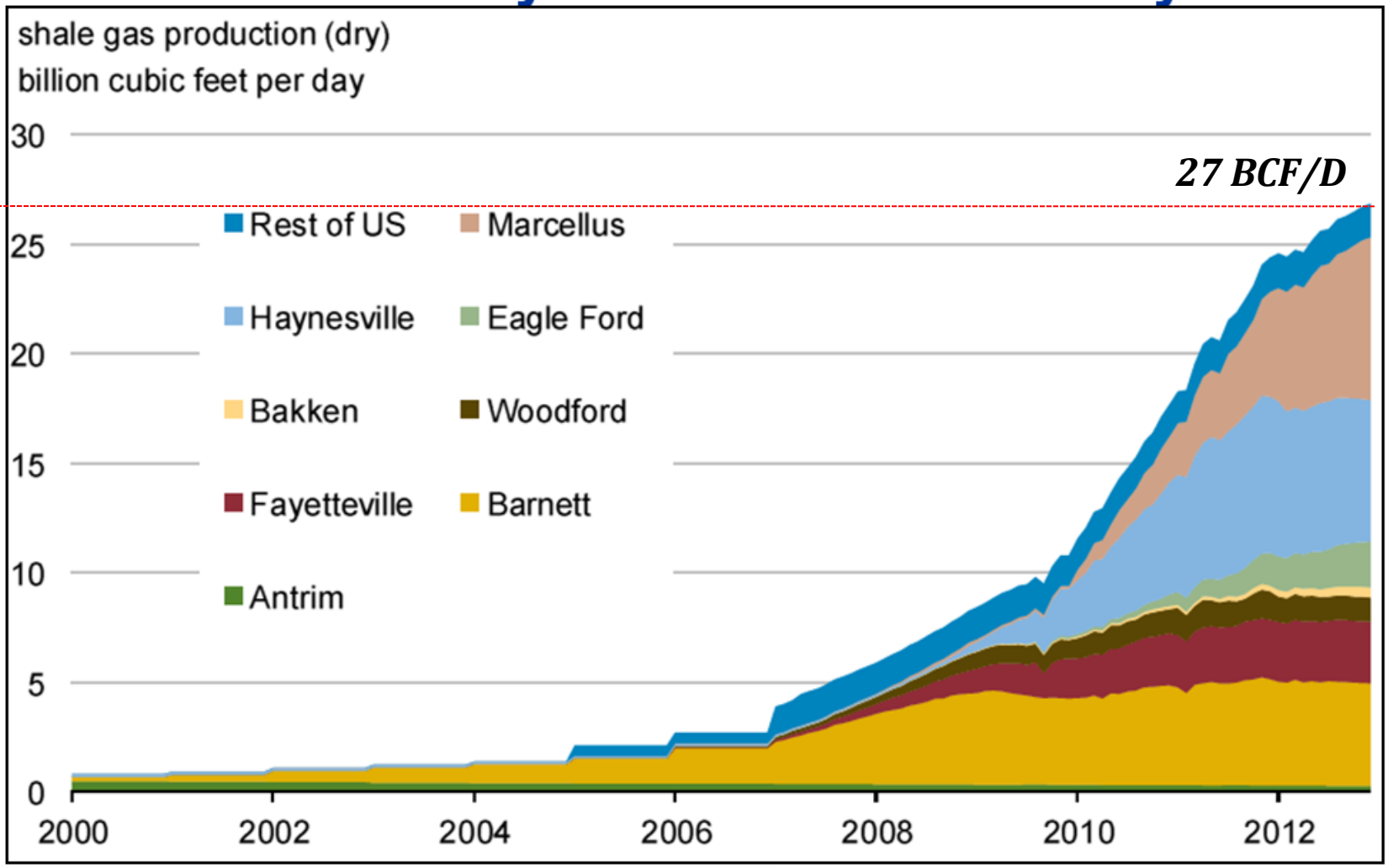
▲ *Major shale gas basins in the United States with total resource potential of 500 to 1,000 tcf (adapted from Schlumberger "Shale Gas White Paper", 2005)*

In **Canada**, while the potential for shale gas in the **Western Canadian Sedimentary Basin** (WCSB) has been determined to be very high (estimates range between 86 to 1,000 Tcf), commercial production has not yet been achieve. To date, potential shale gas plays have been identified in the following regions: **Horn River Basin** in British Columbia, **Montney and Doig** in British Columbia, **Colorado Group** in Alberta and Saskatchewan, **Utica** Shale in Quebec and **Windsor** Basin in Nova Scotia.

Elsewhere around the world, while shale

phasis | consulting

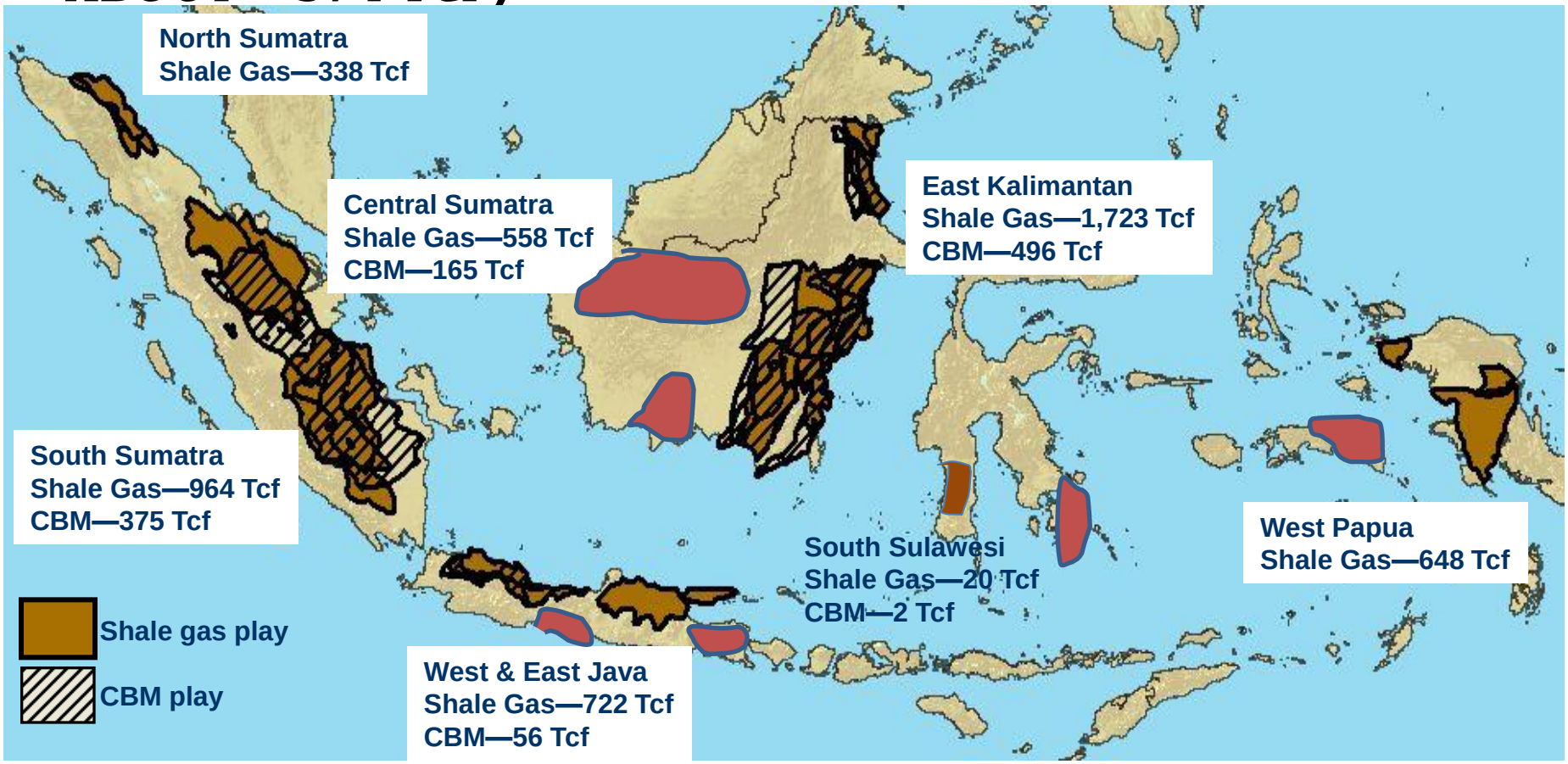
U.S. Production of Shale Gas Has Grown Dramatically in a Portfolio Of Plays



Source: LCI Energy Insight gross withdrawal estimates as of December 2012 and converted to dry production estimates with EIA-calculated average gross-to-dry shrinkage factors by state and/or shale play

HUGE SHALE GAS POTENTIAL IN INDONESIA

- *Large Shale Basins, with ~5,000 TCF GIP (DIRECTORATE GENERAL MIGAS OF ABOUT ~ 1000 TCF, BADAN GEOLOGI OF ABOUT ~ 574 TCF)*



Source: Modified from IHS CERA

Source: After Talisman 2012

IV. HISTORICAL DEVELOPMENT

***Coal Bed Methane** dan **Shale Gas** were developed **relatively in the same time** in the erlies 1980's, altough CBM is initially more famous and earlier produced than shale gas.*

Lesson learn from several countries that developed CBM and Shale Gas, it needs **at least 15 years– 20 years**, starting from exploration to production.

Infacts, there are also **some failure** before countries like USA, Canada, China and India succees in developing unconventional hydrocarbon in certain areas today. It means altough Coal or Shale are present for CBM and Shale gas, but **no guarantee** the gas can be produced **commercially**. This thing has to be input for policy to be issued by GOI.

GLOBAL OVERVIEW OF CBM

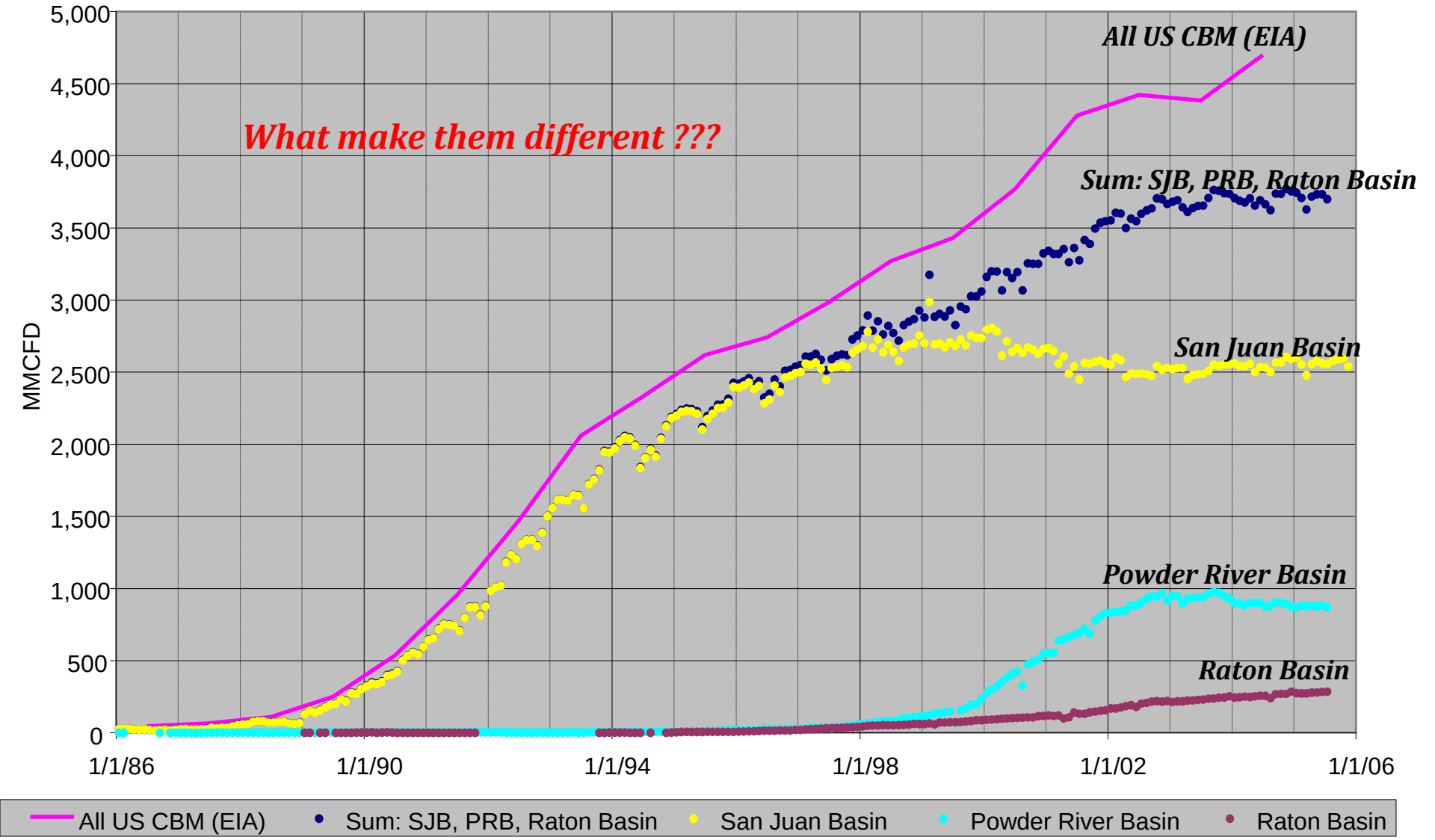
Scientific understanding of, and production experience with, coal-bed Methane and also Shale Gas are both in the early learning stages. "Much is yet to be learned"

1. ***about the controls on the occurrence and recoverability of coal-bed methane and Shle Gas — the geologic, geochemical, engineering, technological, and economic factors, for example***

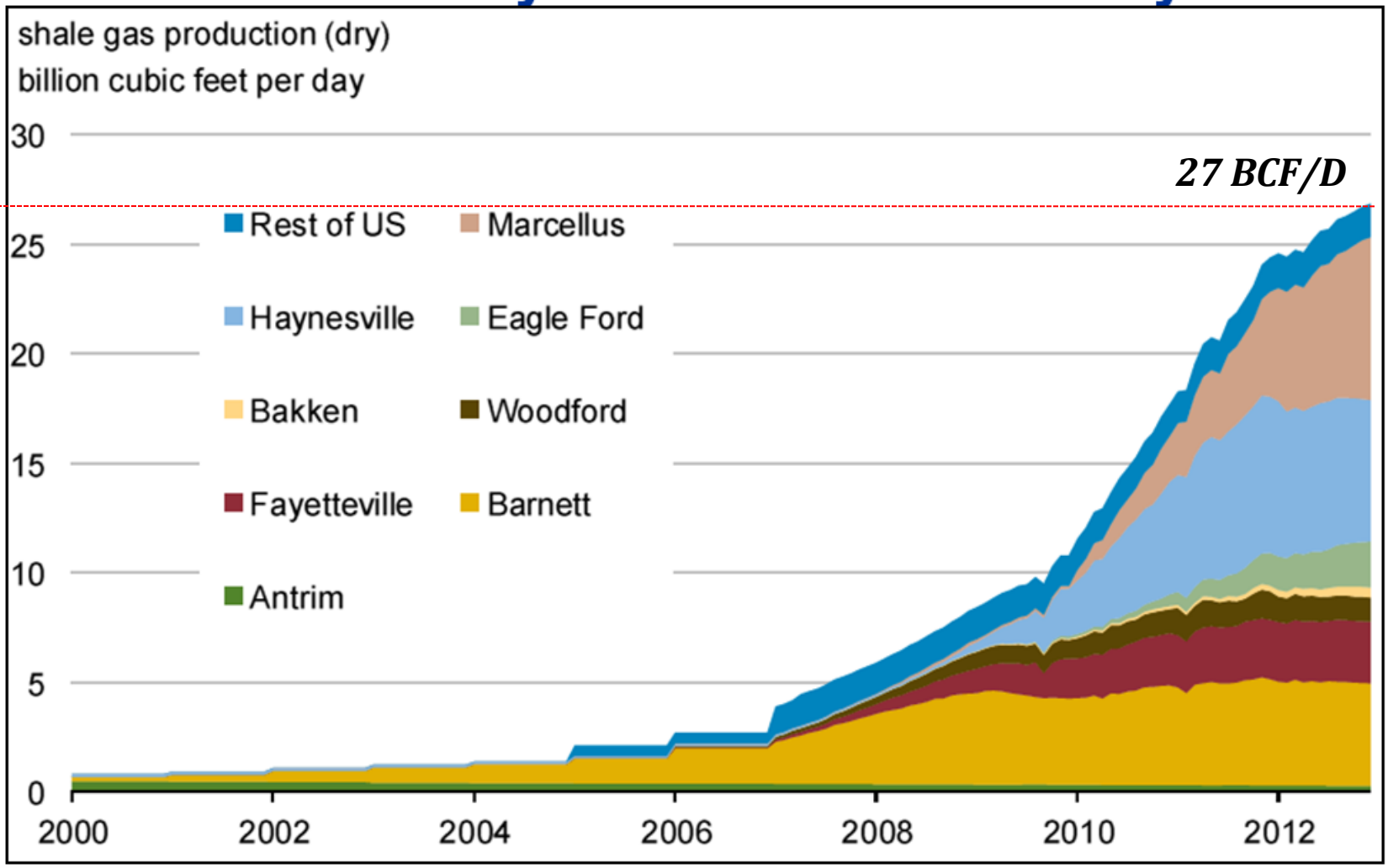
2. ***about the environmental implications of developing the resource***

After USGS, 2000

30 Year History of CBM in United States

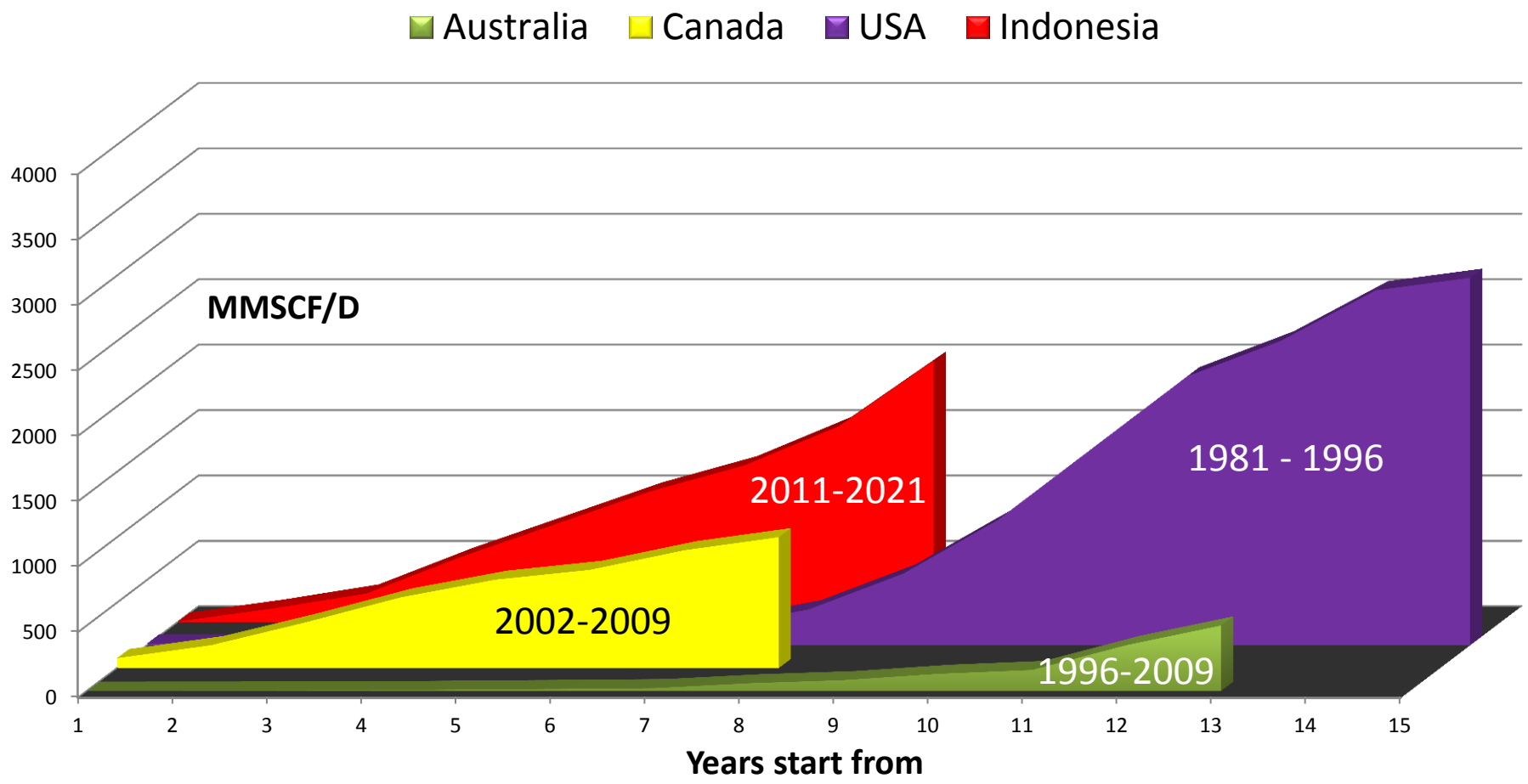


U.S. Production of Shale Gas Has Grown Dramatically in a Portfolio Of Plays



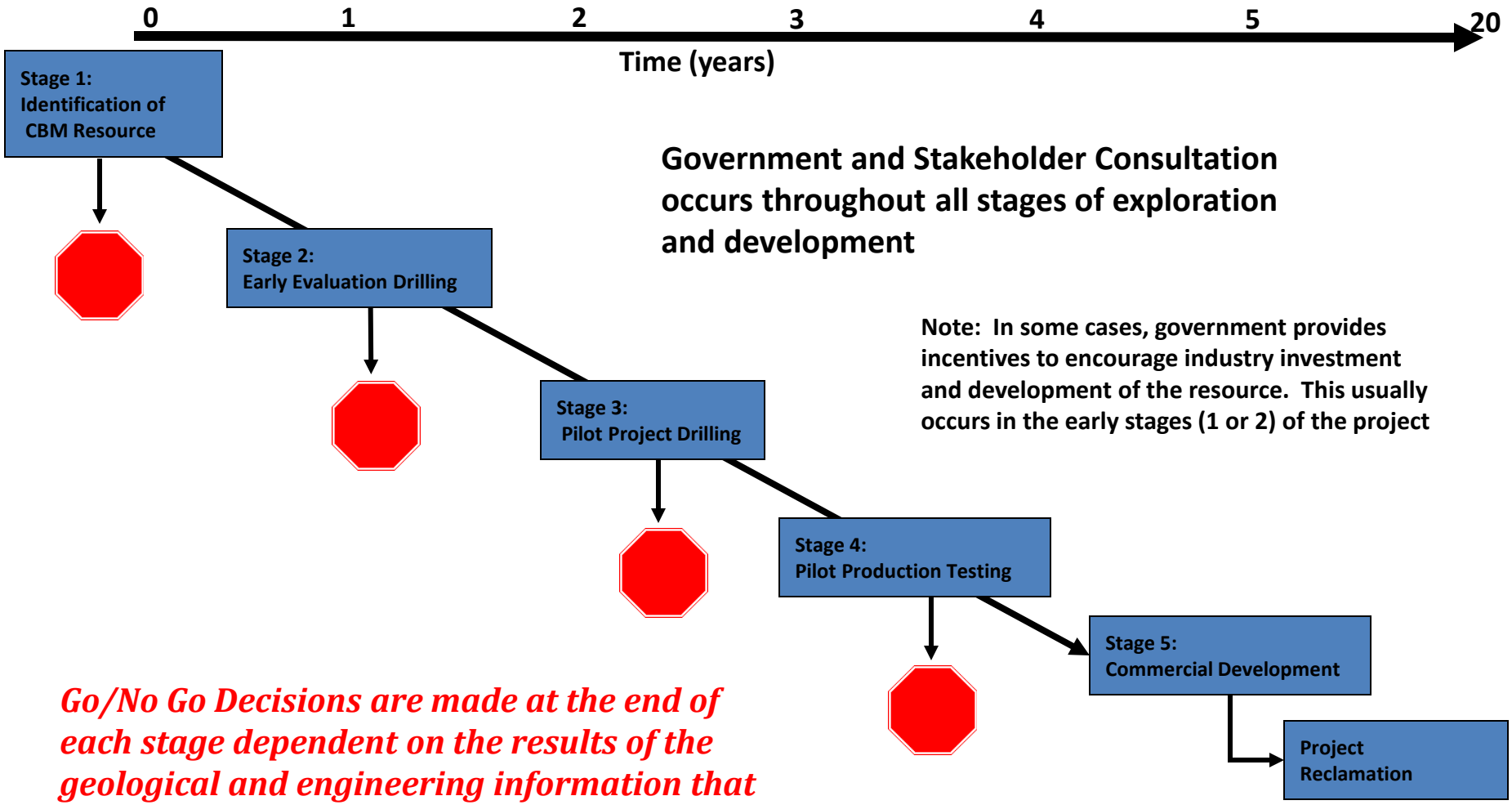
Source: LCI Energy Insight gross withdrawal estimates as of December 2012 and converted to dry production estimates with EIA-calculated average gross-to-dry shrinkage factors by state and/or shale play

CBM INDONESIA GROWTH BENCHMARKING



Source; After Sammy Hamzah 2011

Stages of Exploration and Development



Government and Stakeholder Consultation occurs throughout all stages of exploration and development

Note: In some cases, government provides incentives to encourage industry investment and development of the resource. This usually occurs in the early stages (1 or 2) of the project

Go/No Go Decisions are made at the end of each stage dependent on the results of the geological and engineering information that has been collected

V. S.W.O.T ANALYSES

- ***STRENGTH:***
- ***Indonesia has huge unconventional hydrocarbon potential; CBM Potensial 450 TCF and Shale Gas Potensial1000 TCF***
- ***Indonesia has long experience and regulation in conventional hydrocarbon that can be used as lesson learn to the unconventional hydrocarbon.***
- ***Indonesia position is very strategic***
- ***Future Market for Gas are enormous***

- ***WEAKNESS***
- ***The Potential of CBM dan Shale Gas is not yet proven to be produced commercially.***
- ***It needs big land and many wells as well big capital with low return of investment.***
- ***Simulation reservoir modeling suggest the low rate gas production per well as opposed to the water produced for CBM. In contrast for Shale Gas needs significant water.***
- ***Problems and potential conflict of overlay land use on the surface***
- ***The regulations sometimes too bureaucracy and cause long process whilst economic decision has too be quick***
- ***The infrastructure is still lacking in the area where unconventional hydrocarbon located as this will impact to the high cost production.***
- ***Have no advance technology in production technology for unconvensional***
- ***PSC Regime cannot be comparable to other countries in the world where unconventional hydrocarbon are produced. Since POD is the requirement from GOI for the block to change the status from exploration to production. In contrast, unconventional hydrocarbon has to be developed step by step.***

International examples

- *There is no single right answer for how to improve contractor returns*
- *Different contract types can attract shale investment*
- *Government take must be driven by quality of the rocks and cost structure*

Poland

Royalty/Tax Regime

- *–Taxes rate fixed at 19%*
- *–Royalty is variable, established by a council for each case (~$0.05/mcf)*
- *–Tax deductions: royalty, opex, cap. depreciation*
- *–Gov't take is ~20%*
- *–Long-term contracts*

British Columbia

Royalty/Tax Regime

- *Tax rate is 25%, combined federal and provincial*
- *Royalty is variable, based on well characteristics (~18%)*
- *Incentives for marginal wells and deep targets*
- *Subsidies provided for required infrastructure development*
- *Seasonal royalty credits*
- *Production leases held as long as producing*

Algeria

Royalty/Tax Regime

- *Tax rate 30%*
- *Additional profits tax of 15%*
- *Royalty is region-specific*
- *Wide sliding scale (6-23%) based on daily production*
- *Production licence lasts 32 years*

USA (Eagleford)

Royalty/Tax Regime

- *Tax rate ~39% (federal, state, and local)*
- *Long history of tax credits to encourage development*
- *Several lasting tax deductions*
- *Royalty rates negotiable with mineral owners*
- *Production leases as long as producing*

Source: Talisman 2012

Existing terms are not conducive to shale development

- *Only a world class shale play will be attractive in Indonesia*
- *Play "A" is similar to some being pursued in Algeria and Canada*
- *Target total government take must be lower. Incentives are necessary.*

Plays

Worse → *Better*

Terms: *Worse* → *Better*

Profitability index *Contractor IRR* *Total GoI take**	A (Barnett) **3.0 BCF, dry** $28.1/BOE	B (Montney) **6.0 BCF, dry** $14.5/BOE	C (Eagleford) **6.0 BCF, wet** $9.6/BOE
CBM terms (gross PSC, equiv to 65/35 split**)	-0.5 0% 34%	-0.1 7% 47%	0.6 26% 54%
Traditional terms (PSC 65/35)	-0.3 2% 26%	0.0 11% 45%	0.6 32% 57%
Frontier terms (PSC 60/40)	-0.3 2% 25%	0.0 11% 43%	0.7 34% 54%
Tax only	-0.3 4% 14%	0.3 17% 26%	1.3 47% 33%

** GoI take is Indonesia revenue from all sources, including FTP, share of production, and taxes*
*** Equivalent to 65/35 PSC split implies cost assumption 30% of gross revenue (per MIGAS illustration of gross PSC terms)*

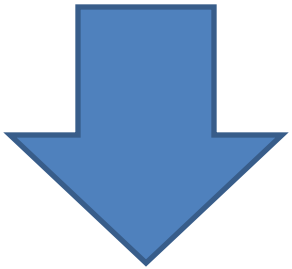
Source: Talisman 2012

- ***OPPORTUNITY***
- ***Available Market;*** ***domestic and international, due to the huge energy need in the future. Hopefully, the energy can be fulfilled by unconventional energy***
- ***Competitive price*** ***of unconventional hydrocarbon in a big number produced as the price becoming cheap***
- ***The flow Foreign infestation*** ***to Indonesia***
- ***Comparative advantage in R&D*** ***in unconventional Energy in Indonesia from huge conventional data.***

- ***THREAT***
- ***Overlapping of land use; Agriculture, Plantation, mining, conventional and unconventional hydrocarbon as the potential conflict in the future, and will definitely impact to exploration and production activity.***
- ***Potential conflict in water use with plantation and agricultural***
- ***The regulation is sometimes too bureaucracy so that take long process***
- ***Fiscal regime is not interested for the investor***
- ***Lack of research and information regarding unconventional hydrocarbon in Indonesia***
- ***Lack of infrastructure cause investors reluctant to invest***

DEVELOPMENT STRATEGY IN THE FUTURE

BASED ON S.W.O.T ANALYSES, DEVELOPMENT STRATEGY CAN BE APPLIED BY COMBINING AND CORRELATING AMONGST S/O; S/T, W/O, W/T STRATEGIES



IT NEEDS WILLINGNESS OF GOI TO ADAPT TO THE NEW REGULATION AND WORK IN HARMONY BETWEEN GOVERNMENT, INVESTOR, UNIVERSITY, FOREIGN INSTITUTION TO SPEED UP THE PROCESS

		STRENGTHS		WEAKNESSES
1	CBM POTENTIAL 450 TCF; SHALE GAS 1000TCF	1	THE POTENTIAL NOT YET PROVEN
2	LONG EXPERIENCED IN CONVENTIONAL	2	NEED BIG LAND AND WELLS
3	GOOD MARKET	3	LOW RATE PRODUCTION
4	COMPARATIVE DEV IN R&D	4	NEED A LOTS OF WATER
5		5	OVERLAY LAND USE
6		6	BUREAUCRACY &LONG PROCESS
7		7	LACK OF INSFRASTRUCRURE
8		8	PSC REGIME NOT COMPARABLE
9		9	
10		10	

	OPPORTUNITIES		S-O STRATEGIES		W-O STRATEGIES
1	AVAILABLE MARKET FOR DOMESTIC	1	DEVELOP UNCONVENSIONAL HYDROC FOR LOCAL MARKET (1,1)	1	
2	AVAILABLE MARKET FOR EXPORT	2		2	
3	COMPETITIVE PRICE	3		3	
4	FLOW FOREIGN INVESTMENT	4		4	
5	COMPARATIVE DEV IN R&D	5		5	DOING COLLABORATION RESEARCH (1,5)
6	COLLABORATION WITH OTHER INSTITUTION	6		6	
7		7		7	
8		8		8	
9		9		9	
10		10		10	

	THREATS		S-T STRATEGIES		W-T STARTEGIES
1	CONFLICT OF OVERLAPPING LAND USE	1	ADJUST NEW REGULATION FOR AVOID CONFLICT (1,2)	1	
2	CONFLICT AND LACK OF WATER FOR FRACTURING	2		2	
3	NOT INTERESTED FOR INVESTOR	3		3	
4	NO INVESTMENT	4		4	CREATE MOU FOR MUTUAL BENEFIT BY ADAPTING NEW REGULATION (6,3)
5		5		5	ADJUST FISCAL TERM MORE ATRRATIVE (8,3)
6		6		6	
7		7		7	
8		8		8	
9		9		9	
10		10		10	

CONCLUSIONS

- *CBM and Shale Gas development have been successfully developed in many countries with the present of market for natural gas. In Indonesia, it is roughly estimated the potential resources of CBM is about 450 TCF and for Shale Gas is about up to 1000 TCF .*
- *CBM and Shale Gas development has reached commercial stage in countries such as; USA (with total production just for Shale Gas up to ~27 Bcf per day), Canada, Australia, China and India*
- *CBM and Shale Gas as clean energy with cheap cost, and very reliable to support natural gas for long time period.*
- *CBM and Shale Gas projects tremendously need high investment and capital and need significant time between 5 - 10 years before reaching commercial stage (as an example not all CBM Project in USA can be successfully operated. It depends geological condition and parameter of coal itself).*
- *Unconventional hydrocarbon environmentally is more accepted compared with other hydrocarbon resources (coal and fossil fuel energy).*
- *The success of CBM and Shale Gas projects are influenced by several factors, that is;*
    - *The ability to produce natural gas in economic stage*
    - *The ability to control exploration and development costs*
    - *The presence of good domestic market and also export.*
    - *The access of good infrastructure (both available infrastructure and low cost in the future)*
- *The Development and success in CBM and Shale Gas development in Indonesia can lead Indonesia to be a country with self-dependence energy and welfare.*

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Terimakasih